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ABSTRACT

Developed as part of a project to adapt a high school world history text for use with mainstreamed mildly handicapped students, this guide does not focus on any particular age group or content area. After an introductory section explaining the project's background, a rationale for textbook adaptation is offered followed by a description of the process approach to adapting textbooks. Next five steps in the design, development, and evaluation of materials are briefly explained: (1) identifying needs, (2) adapting materials, (3) reviewing materials, (4) implementing curriculum adaptations, and (5) evaluating materials. Also identified are student learning needs that can be addressed with adaptive materials and strategies (e.g., simplified vocabulary, repetition, focused attention, reinforced concepts, slower program pacing, positive reinforcements, and sequenced learning tasks). A chart compares adaptation characteristics of teacher and student materials with examples and explanations of needs served. Types of textbook adaptation materials are discussed including audiocassettes, computer software, print supplements, and other media. A chart of computer software capabilities compares learner characteristics, instructional adaptations, and computer software capabilities. (DB)

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Guide to Textbook Adaptation

FINAL REPORT

FOR

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Macro Systems, Inc.

July, 1985

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APPENDIX A

GUIDE TO TEXTBOOK ADAPTATION

GUIDE TO TEXTBOOK ADAPTATION

INTRODUCTION

The special education movement of the 1960s concentrated curriculum development and teacher training efforts in the separate special education classrooms of the nation's elementary schools. By 1975, with the "least restrictive environment" mandate of Public Law 94-142, this strategy for educating handicapped students was well entrenched, leaving a gap between public policy and the capability of the nation's schools to respond. Even into the 1980s, this gap continues. The demand for serving handicapped youth in the regular classrooms is significantly impaired by the lack of both training and materials development, especially at the secondary level. Faced with this need to teach a diverse group of learners in one classroom, many secondary schools were forced to embark on the long and costly process of developing their own curriculum adaptations for the mainstreamed handicapped learner.

The U.S. Department of Education, recognizing this need for secondary-level curriculum adaptations, in 1982 and again in 1983, solicited competitive proposals from qualified bidders to develop curriculum adaptations as supplementary material to published texts. The objectives were both to improve the quality of instruction provided to handicapped youngsters and to stimulate publishers to develop similar curriculum supplements aimed at this population.

The request for proposals from the Department of Education posed a challenge to prospective curriculum designers to develop a working relationship among the diverse groups involved in such an educational-business venture. The final curriculum product, to be successful, must incorporate in its development the needs of classroom teachers, handicapped students, school systems, curriculum specialists, subject matter experts, the publisher, and the author. The proposed curriculum adaptations, must meet the specifications of all these groups.

Macro Systems, Inc., was awarded contracts by the Department of Education in 1982 and again in 1983. Macro Systems is an applied research and management consulting firm, which has won recognition for the quality of its work in human services support and evaluation. Macro's 16-year corporate experience in curriculum and materials development and in human services evaluation and training is augmented by the personal experience of its project team members in special education programming and curriculum design and in educational research and evaluation.

Macro staff gained experience and expertise in the performance of the first contract award in 1982 by the Department of Education. This contract focused on the development of supplementary materials to accompany a middle school social studies text. Materials were created to meet the needs of mildly handicapped middle school students mainstreamed into regular classrooms.

The Macro project team selected for the second contract a senior high school social studies text for the curriculum adaptations. The text and teacher's guide were readily

adaptable in content, format, and skill level for the needs of mildly handicapped mainstreamed high school youth.

The major thrust of Macro's approach to textbook adaptation is to make maximum use of the knowledge, skills, and professional judgement of the classroom teachers who daily face the challenges of educating handicapped students. At selected schools that serves as test sites, a team of teachers and Macro project staff work together to identify the learning characteristics and needs of both the handicapped students and their teachers. Using these assessed needs and characteristics as guidelines, the Macro curriculum specialists develop supplemental materials to bridge the identified gaps between the content and format of the text and the capabilities of the handicapped students. Classroom teachers, with assistance and training from Macro staff, put the materials to use in their classrooms. As a team, the teachers assess the effectiveness of the materials in meeting both classroom management and handicapped learners' needs. Revisions of the materials are based on the classroom experience of these teachers with their students.

TEXTBOOK ADAPTATION—A RATIONALE

The reasons for adapting textbooks to meet the needs of mildly handicapped mainstreamed students are many. Regular classroom teachers are assuming more responsibility for teaching handicapped students and they need materials and training to prepare and support them in this role.

Typically, the characteristics of regular classroom teaching are not conductive to addressing individual learning styles of students or to accommodating teaching strategies to meet student needs. Most teachers are instructing large numbers of students. The demands on their time result in little time to develop and implement a specialized plan for any student with special instructions needs. Lecture and discussion combined with the ever present textbook are the most widely used instructional practices. These strategies are limited in their effectiveness with handicapped students who profit from individualized materials and alternative learning modalities.

A significant vacuum exists in both the creation and the adaptation of materials for handicapped students placed in the regular class. The 'equal' provision of P.L. 94-142 suggests that these mainstreamed students should participate, whenever possible, in instructional activities alongside their nonhandicapped peers. Adaptive, supplementary materials to the main text are one way of meeting this provision and enabling the teacher to provide assistance in a time-efficient fashion.

The benefits of adapting materials for mildly handicapped students are many. Mainstreaming for academic instruction is usually determined on the basis of an individual student's ability to function at or near the level of the nonhandicapped student in a specific content area. However, many instructional materials, especially at the senior high level, tend to require more sophisticated analysis and synthesis. Print materials require advanced vocabulary development, and the pace of instruction presumes an ability to absorb information rapidly. Clearly, mildly handicapped students in these settings can profit from supplemental materials that present concepts in more palatable increments, use vocabulary that communicated those concepts more simply, deal with reading comprehension and language skills, and focus on developing listening and attending skills.

Since many mildly handicapped students suffer from poorly developed listening and attending skills, they profit from educational strategies that aim to strengthen their ability to integrate ideas and information obtained through an oral medium. For example, audiocassettes are an effective vehicle for communicating important concepts in a simplified way and, at the same time, developing listening and attending skills. This oral medium, like the microcomputer, invites active involvement. When the material included in the audiocassette is creatively produced using sound effects, music, and other enhancers, listeners are enticed and cajoled to participate, using their imaginations and full senses to interact with the sound.

A need also exists for printed supplemental materials that assist mildly handicapped students to better utilize textbooks in basic content areas. These printed materials can help mildly handicapped students develop specific skills in such areas as using charts and graphs, increase vocabulary and reading comprehension, and learn important study skills. Their potential as homework assignments and their flexibility as independent assignments make them an attractive adaptation product.

The microcomputer is being explored as another means for adapting or supplementing print materials to meet the individualized needs of mainstreamed mildly handicapped students. The capabilities of a microcomputer—high resolution graphics, visual and other sensory immediate feedback, and allowance for student self-pacing and timing—make it highly conductive to individualized instruction. The microcomputer requires active engagement on the part of the student, stimulates curiosity, and is an attractive device for producing high attention to task.

High school mildly handicapped youth can especially benefit from exposure to the microcomputer. These students are a transitional group in this new "information age", having had little or no experience with computers during their elementary and junior high school years. Today's elementary aged student will have many opportunities to work with the computer and will eventually use it as extensively as paper and pencil. High school handicapped students about to graduate will have to be able to handle the "information age" or will find themselves unable to deal effectively with their environment and to obtain and hold a job.

The microcomputer can also assist teachers in management tasks such as keeping student records and managing curriculum information. Instructional management software can help teachers with requirements of the Individualized Education Plan by keeping track of objectives, methods, and materials used in the social studies program. Teachers can monitor student progress on specific lessons and use the information in student reports for parents. The use of microcomputers to collect, organize, store, and retrieve a variety of information can help teachers carry out instructional, organizational, and administrative tasks in less time, leaving them more time for other responsibilities.

Given the tremendous capability of microcomputers, the quality of presently available educational software has been disappointing. There has been a short supply of programmers and curriculum experts qualified to produce educational software. In addition, publishers have been hesitant to risk development money. Handicapped students have suffered from an extremely limited quantity of software.

A PROCESS APPROACH TO ADAPTING TEXTBOOKS

The American College Dictionary defines adaptation as "a. alteration in the structure or function of organisms which fits them to survive and multiply in a changed environment. A form or structure modified to fit a changed environment." These definitions support an approach to curriculum adaptation which stresses the interaction of the organisms—teacher and student—with the form and structure; in this case, materials and school setting.

Successful adaptation is a process that is "learner centered." It requires changes not only in the format, content, and method of presentation of the material but also in the methods and style of instruction used by the teacher in response to the needs and behaviors of the students. This process results in the development of materials—for both the teacher and the students—that ultimately help students learn more successfully alongside their nonhandicapped peers.

Key Considerations

The accommodation of the mildly handicapped learner in the regular classroom is a sound educational practice if the general curriculum can be adapted to incorporate both the instructional needs of the teachers and the learning needs of these students without detriment to the needs of the regular classroom students. Learning principles and methods that apply to the needs of these special students and their teachers can be applied as an enrichment to the total classroom learning environment, benefiting not only the mildly handicapped students for whom they are designed but the nonhandicapped students who share some of their educational needs, characteristics, and opportunities.

Instructional adaptations can take two basic forms: one set of materials for the teacher and another for the mildly handicapped students themselves. Development of these materials should integrate the assessed needs of all those involved in the educational effort, from the classroom teacher and student, to the school administrators at local and State levels, to the publisher whose text provides the basis for adaptation.

There are key considerations that are critical to the development of successful adaptation materials.

- Identifying the learning needs that are common to the mildly mentally retarded, learning disabled, and emotionally disturbed students who constitute the targeted population of mildly handicapped students. A focus on the needs most common to the three groups increases the wider use of the materials by regular students and the generalizability of the methods to other subject matter.

- Incorporating the instructional needs of the classroom teachers who teach this target population. Instructional needs are broadly defined to include the teachers' knowledge of this student population, skills in classroom management, and teaching methods and materials specific to those special students.

- Determining the production and marketing needs of the publisher and author. In order to convince publishers and authors of the visibility of textbook adaptation, the product as an economic and educational commodity must be capable of providing economic returns to publishers and educational returns to buyers. This suggests the need to meet both publisher specifications in terms of production and marketing and author specifications in terms of curriculum content and objectives.

- Developing goals and objectives based on these findings. The specific goals and objectives of the adaptation products should be responsive to an amalgam of the needs of teachers, students and publishers, and balance their diverse needs.

- Equipping students with skills that can enhance their employability. At the senior high school level it becomes critically important to attend to future prospects of these mildly handicapped mainstreamed youth. By including a computer software component geared to the needs and capability level of mildly handicapped youth, we are exposing these students to the coming requirements of an information age where comfort with this device may be a requisite for competing in the marketplace.

STEPS IN TEXTBOOK ADAPTATION DESIGN, DEVELOPMENT, AND EVALUATION

The textbook adaptation process should incorporate an integrated design, development and evaluation approach. Initial materials are developed, tested, revised, retested, and so forth throughout a planned sequential development/evaluation approach. These activities and their results are used to make decisions regarding modifications, adaptations, and revisions to a product throughout the development phase. The design, development and evaluation activities are closely intertwined, with the evaluation activities supporting the development activities.

The process should involve initial input and ongoing feedback throughout the development phase from all parties involved and these may include teachers, school administrations, curriculum supervisors and specialists, author and publisher.

The input and feedback must be obtained in a systematic manner, using a standardized process to ensure comprehensiveness and usefulness. Yet, the feedback loop and communications process must be flexible and fluid so that constructive and creative suggestions are not stifled from any party involved. Attention must always be focused on the developmental activities using the evaluation results to guide the process and refine the products.

Clearly defined criteria must establish the parameters of the final form of materials. These criteria will be agreed upon by the parties involved in the adaptation process at the outset of this evaluation phase and should be used to determine when the materials are ready for final revisions and production. Clearly defined and agreed-upon criteria will help to ensure a quality product by building in the necessary quality control assurances.

The adaptation process involves a cycle of activities, including: (1) identifying needs, (2) adapting materials, (3) reviewing materials, (4) implementing curriculum adaptations, and (5) evaluating materials (see accompanying illustration on next page).

- Identifying Needs—Textbook adaptation should be based on a careful analysis of the needs of all parties involved, from the classroom teacher and student, to the school system, to the publisher, editor, and author. Two basic types of assessments can be conducted to achieve this product objective: an instructional needs assessment to determine the educational requirements of the curriculum supplements and a marketing needs assessment to determine economic requirements. Incorporating these assessed needs into the process of product development is one step in ensuring the usefulness of the final product.

  Assessment of instructional needs should focus on the classroom learning environment, encompassing the needs of both classroom and resource room teachers and the mildly handicapped students. The student profile should also be included in this assessment, as learner characteristics are essential to determining teacher and student instructional needs. The focus of this assessment process should be on those aspects of the curriculum supplements that determine their instructional usefulness: subject matter content, objectives of the material, learning strategy involved, skill and aptitude level, format, and classroom management characteristics.

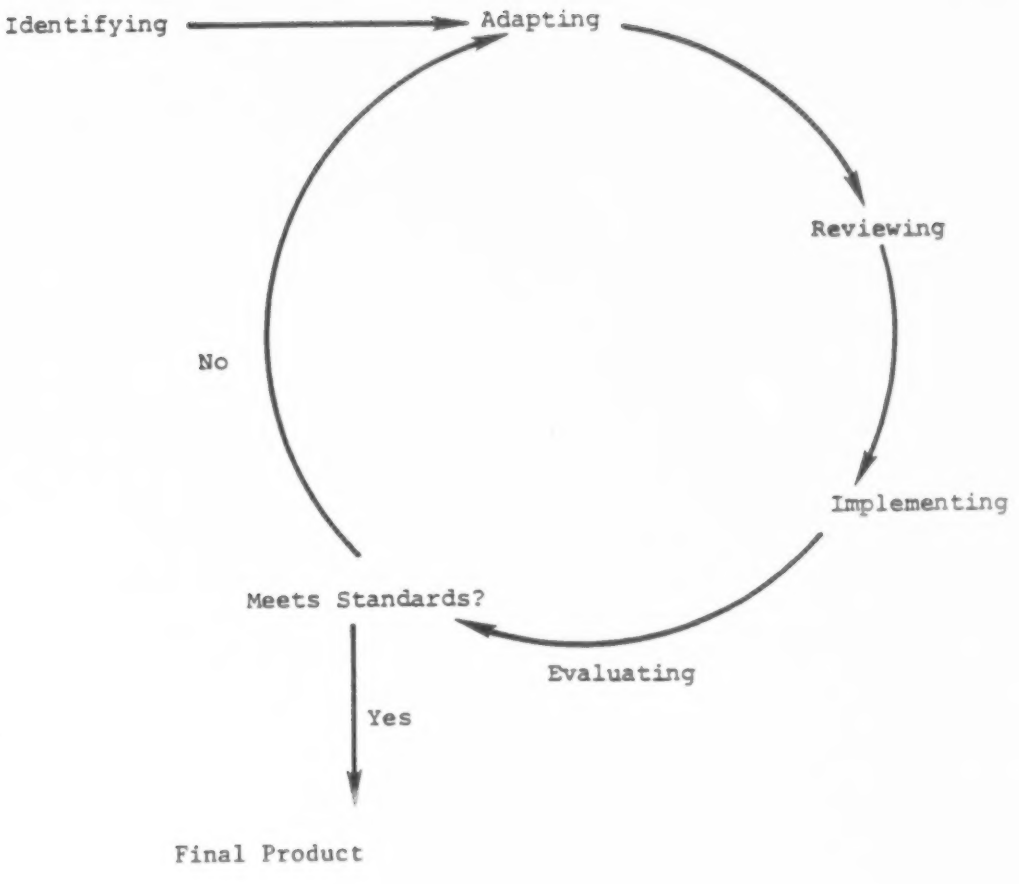
  The marketing needs assessment should address the needs of the school systems at both State and local levels and of the publisher, editor, and author of the selected text. The focus of this assessment is on those aspects of the curriculum supplements that determine their production and commodity characteristics—aspects such as cost, packaging, marketability, and distribution.

- Adapting Materials—Initially, prototype materials are produced that meet the identified goals/objectives of the curriculum adaptation and meet established evaluation standards. In later cycles, revisions to the adapted materials may be necessary to meet established standards

- Reviewing Materials—These materials are then reviewed by teachers and other involved parties for feedback. Initially, feedback is solicited and incorporated into immediate revisions prior to field testing. Later in the process the need for immediate modification is often alleviated as the curriculum designers become more proficient at meeting the perceived needs on the initial pass.

- Implementing Curriculum Adaptations—Participating teachers incorporate the use of these materials into their normal classroom instruction. They keep systematic records of their implementation of the materials with their target students and record observations of the effectiveness of these materials with specific students. Periodic classroom observations of the materials implementation are helpful, whenever they can be done.

STEPS IN ADAPTATION DESIGN, DEVELOPMENT, AND EVALUATION



- Evaluating Materials—Once the set of materials is tested, the participating teachers can be called together to solicit feedback on the effectiveness of the materials and suggested revisions. Interactive group discussions supplemented with written observations are a good vehicle for obtaining the feedback necessary to identify substantive modifications. The evaluation results are then compared to the criteria established for the curriculum adaptations. If the materials meet all standards they are ready for final revisions and production. If not, it will be necessary to continue the process, recycling to the adaptation stage and so on.

The criteria established for judging the material adaptation play a role in the adaptation process. The criteria to be developed should address questions such as:

- Are the specific curriculum adaptation objectives met?
- Is the material at an appropriate level for the target students?
- Does the material attract, stimulate, and sustain student interest?
- Do teachers find the materials helpful and convenient to use?
- Do teachers find the materials useful for their students?
- Do the adapted materials produce the type of results with the target students that the original materials produce with their target students?
- Does the adaptation meet several deficit areas of students, or does it simply meet the needs of a few students?
- Are the adaptations still true to the curriculum content?
- Are the adaptations indeed an improvement over the existing curriculum for the target students or merely a new set of curriculum materials?

A LOOK AT THE RESULTS OF NEEDS ASSESSMENT

Macro Systems conducted an instructional needs assessment of teachers on two occasions to determine the type and area of textbook adaptation to be developed. The results of these assessments do vary, yet there are similarities and commonalities in the responses that warrant consideration by anyone who wants to pursue textbook adaptation to meet the needs of mildly handicapped mainstreamed students.

- While teachers focus on the problems of handicapped students in the classroom they are also aware of their positive attributes.
- Teachers perceived that problems of reading comprehension, thinking skills, written and oral language skills, and conceptual skills are the primary learning barriers faced by mildly handicapped students.

- Teachers think that materials developed to supplement basic textbooks should capitalize on the motivation of these students to succeed and should account for alternative learning strategies and disabilities.

- Teachers that that these supplementary materials should primarily be in the form of workbooks or worksheets, audiocassettes, overhead visuals, and microcomputer software.

- In addition to the student instructional materials, teachers need, for their own use, information on methods of team teaching such as working with other teachers and specialists, methods of involving students more directly in planning and implementing curriculum activities, ways of meeting IEP objectives, and adapting both methods and materials for diverse student needs.

- Teachers have previously attempted to vary instructional delivery methods and approaches to meet the special needs of mildly handicapped students.

STUDENT LEARNING NEEDS THAT CAN BE ADDRESSED WITH ADAPTIVE MATERIALS AND STRATEGIES

The characteristics of students with learning deficits are exceedingly varied. Some characteristics appear frequently, whereas others rarely appear. Their impact on student learning and student need also varies depending on such factors as teacher, subject, environment, instructional strategy, and materials.

Although some individuals within a category may share common characteristics, and although one commonly finds stereotype references to a specific handicap, various groups of handicapped persons are not homogenous. Handicapped individuals within the same category vary. All mentally retarded learners, for example, do not have coordination difficulties nor do all learning disabled students have the same type of perceptual deficits.

Adaptive materials are not a panacea for increasing the educational success of all mildly handicapped students. Yet there are some learning needs that can be addressed with this educational intervention:

- Simplified Vocabulary—Many mildly handicapped persons have a limited reading ability and have difficulties acquiring and retaining vocabulary. They need simplified sentences and vocabulary to help in understanding material.

- Repetition—These students may have auditory and/or visual memory deficits which may lead to difficulty in the assimilation, storage, and retrieval of information. The repetition of relevant material in varying presentations and formats gives a student more opportunity to grasp the information.

- Focused Attention—It can be difficult for for mildly handicapped students to focus on any particular activity for any length of time. They are easily diverted from a simple task or are threatened by a more complex activity. These individuals need help in focusing their attention on the materials at hand. Some mildly handicapped persons are hyperactive (i.e., restless, engaged in random activity), and they too need their attention focused in order to achieve. Materials that have a dark border around them help to direct attention to the content.

- High Motivation Level—Mildly handicapped persons may have low levels of motivation and need interesting and enticing materials and innovative approaches to stimulate their learning that serve as enhancements to the basic text.

- Reinforced Concepts—Mildly handicapped students may be slower at grasping concepts. They need instruction that starts at a more concrete level, is presented in smaller steps, and allows for immediate response and feedback.

- Slower Pacing Of Program—Mildly handicapped individuals may have perceptual disorders. A student with auditory perception problems, for example, may not be able to differentiate between different sounds of consonant blends. A slower-paced, well-enunciated program helps students alleviate perceptual deficits. Some mildly handicapped persons have a slow speed of reaction and can benefit from a slower paced program that gives them time to ponder a situation.

- Positive Reinforcements—Mildly handicapped students often need to experience success to improve their self-concept and motivation. Positive reinforcement and feedback would help build confidence and stimulate learning.

- Management Of Time And Task—Mildly handicapped students may be unable to organize their work assignments efficiently and become easily frustrated. Work for these students should involve task analysis and a great deal of structure.

- Sequence Of Learning Tasks—Mildy handicapped students may be unable to perform tasks that progress from simple to complex. They need assistance in sequencing their work so that they understand the logical order of the tasks.

- Application of Previously Learned Skills—Mildly handicapped students may have great difficulty using what they have studied in one environment to a new or different context. They need direct instruction in how to transfer skills and knowledge to a new setting.

TEXTBOOK ADAPTATION MATERIALS AND STRATEGIES

Experience in the design and development of adaptive supplementary materials suggests that while the specific content of the adaptation varies and is determined through needs assessment there are characteristics of instructional adaptations that should be considered by developers. (See illustration on the next page for characteristics and examples). Teacher materials should include background information on the student population. Classroom management strategies and skills should be addressed as well as instructions for the use of the adapted materials included in the package. In preparing student materials, developers must consider the pace and interest level of the materials as well as the sequencing of instruction and the amount of material presented. Repetition and review are other critical characteristics of adaptive supplementary materials.

An analysis of the text from which the adaptive materials are being developed should include consideration of areas such as:

- Material content
  - Vocabulary and reading comprehension
  - Concept development and generalization
  - Reasoning and decisionmaking
  - Specific skill development
- Method of presentation/organization
  - Sequence of material
  - Amount of material presented
  - Method of presentation
  - Type of directions given
  - Amount of repetition and review
  - Type of evaluation and testing
- Format
  - Design, layout, and print of overall text and individual pages
  - Organization of teaching units
  - Large/small group student usage
  - Independent student usage
  - Effective use of graphic display

ADAPTATION CHARACTERISTICS FOR TEACHERS AND STUDENTS

Curriculum Supplements	Examples	Needs Served
I. Teacher Materials Characteristics		
. Background information on mildly handicapped students	. Definitions of mildly handicapping conditions . Developmental characteristics - Cognitive, social, and affective - Adaptive and nonadaptive behaviors . Learner characteristics and needs	To provide teachers with sound knowledge base to understand the mildly handicapped students in their classrooms
. Classroom management skills	. Grouping by instructional needs . Non-teacher-directed instructional techniques . Methods of recording student progress . Student motivational techniques	To provide teachers with skills and techniques to structure and manage a multilevel and multi-activity learning environment
. Instructions for use of adapted curriculum materials	. Instructional objectives . Teaching suggestions . Learner activities . Problem identification and correction . Use of audiocassettes and computer software . Use of evaluation materials	To instruct teachers in appropriate use of adapted materials for various learner needs and instructional purposes
II. Student Materials Characteristics		
. Self-instructional . Self-paced . Small instructional units	. Prescribed learning activities based on selected segments from text	Teachers need for materials for independent use by students
. Careful sequencing of instruction . Concrete illustrations and examples . Structured introduction of concepts . High interest level . Provision of prerequisite skills and knowledge	Readiness materials that teach skills required to use text	Geared to motivational characteristics and ability level of students
. Multisensory	Audiotapes, charts, visuals, work sheets	Permits alternative learning strategies and styles
. Provides for student evaluation and feedback	. Prescriptive tests . Tests of student competencies . Tests of learning objectives . Student feedback and self-assessment	. To determine areas of need and placement in instructional sequence . State and local curriculum mandates . Evaluation for teacher planning of instruction . Reinforces student learning, self-correction

Upon completion of the student assessment and an analysis of the textbook strengths and weaknesses, it is possible to identify strategies for adaptation that will result in supplementary supportive materials. Simple strategies to address specific learning needs include:

Area to Be Addressed	Strategy
Vocabulary Development	Modify vocabulary . Rewrite directions on workbook . Provide vocabulary list with synonyms or simplified definitions
Reading Comprehension	Tape record materials . Record directions for learner reference . Record passage; learner follows written text
Concept Development	Develop materials that utilize different modalities . Reinforce text with visual supplements such as illustrations, pictures . Develop readiness materials that teach prerequisite skills that are necessary for conceptual understanding
Listening Skills	Increase repetition . Develop audiocassettes that present information in the text; assign student to repeat selected selections using cassette. . Develop checklist of information being presented from text; student checks items as he/she hears them during oral presentation

TYPES OF TEXTBOOK ADAPTATION MATERIALS

Audiocassettes

An audiocassette can incorporate a variety of learning modalities—auditory, visual and kinesthestic—to present and reinforce ideas, concepts and important facts. Audiocassettes provide an opportunity for the developer to simplify concepts and language and to increase student motivation attention and listening skills.

Audiocassettes that highlight or summarize the content of the textbook can provide prereading anticipation, review of material after reading, and reinforcement of the main ideas. They need not be used as a substitute for reading but rather as a reinforcement to it. Scripts can be prepared to accompany any student listening. Audiocassettes in social studies, for example, can present main ideas of a textbook chapter using simple language enhanced by sound effects, music, dramatization and effective narration. Students can be asked to recall what they heard, to extend ideas with discussions about an historical event.

Student activity worksheets can also be developed to accompany the cassettes and to extend, review and support them. These worksheets might focus on identifying main events, important people or important concepts.

Vocabulary audiocassettes are an effective approach to student reading of written vocabulary definitions and they can be helpful in reviewing definitions.

A procedure that can be used in preparing a cassette is:

- Each definition is read word-for-word from the written sheet
- Each word or phase is used in context in a sentence
- Students say the word aloud with the narrator
- Students find the word at the bottom of the definition worksheet and circle it

Each segment should be brief and not more than 10 minutes so that student attention remains focused. Brief musical interludes can be used to separate various segments.

Students who have difficulty grasping the written definitions can use the cassette prior to class reading tasks and students can use them as an aid while working on the worksheets. For a student who has excellent oral vocabulary and listening skills and limited reading abilities, this cassette is an excellent way of employing student strengths to develop weaker areas.

Computer Software

The microcomputer is a phenomenon that is rapidly growing around the nation and shows great promise as a support for efforts to individualize and adapt instruction and as a strategy to assist teachers overburdened with demands on their time. It enables the teacher to establish for the student a close and immediate link between instruction, assessment, feedback, correction, and/or reinforcement. It requires students to be

active participants in interacting with the computer, and it is "programmed" for success, thus, increasing the students' sense of competence through mastery of new skills in a failure-free, nonthreatening environment.

However, in using the microcomputer as an instructional supplement for mildly handicapped learners, it is vitally important that software for these machines be designed with the learners' needs as a basis and their limitations as a constraint. The chart on the next page presents learner characteristics and instructional adaptations that relate to computer software capabilities. The key to successful use of this resource is understanding the characteristics of mildly handicapped learners and using content material that captures their imagination and their interest.

Microcomputer software can be developed in different content areas to support and supplement the basic textbook. It provides an alternative and stimulating learning modality to traditional print instruction, and it can perform many functions to enhance curriculum and instruction. As a patient teacher it provides students with stress-free "drill and practice." As a responsive instruction the microcomputer has interactive capabilities that are important in providing "tutorial" learning experiences. Concept building activities can be presented as well as development of thinking skills, or reinforcement of reading skills.

Databases can be created in different subject/content areas and when combined with a data base manager and pedagogical activities, they offer powerful supplementary learning supports. Data bases in american and world history for example, can help students learn facts, understand relationships, and develope concepts.

Software can also be developed that simulates situations presented in textbooks. Simulation is an educational strategy that has been used in a variety of ways to reinforce learning. Role-playing, for example, has effectively been used in history classes to enable students to better understand historical characters and their reasons for making certain decisions that have had important consequences. Computer software can be developed that simulates the presidential campaign process, or that reinforces learning about the planetary sciences by simulating the process of commanding a space ship.

Computerized instructional management systems can also be developed to accompany a textbook. They can record, compute, and print reports of student performance. The teacher with mainstreamed mildly handicapped students can monitor student performance carefully and systematically. Documentation of student work can then be made available for parents and other professionals. These management systems are effective in evaluating student progress and meeting IEP requirements. Objectives can be prepared that are correlated to the textbook and software can be developed to chart student progress in meeting the objectives.

Print Supplements

Mainstreamed mildly handicapped students can profit from adaptive materials that present concepts on more palatable increments, use vocabulary that communicate concepts more simply, lower the reading level of the basic text, address reading comprehension and language skills and focus on developing listening and attending skills.

These printed materials can be designed as student activity and study sheets that strengthen material presented in the textbook through use of creative repetition. The

COMPUTER SOFTWARE CAPABILITIES

Learner Characteristics	Instructional Adaptations	Computer Software Capabilities
Distracted by unimportant information	Add structure and focus	Magnified print, underlining, color coding, other highlighting features such as visual and sound displays; add directions
Respond either very quickly or very slowly to verbal or written questions	Delete extraneous information; lower or modify pace or vocabulary	Include extra demonstrations, examples, and practice; program computer to allow extra responding time; prompts, like a flashing light for hurry up or a stop sign to slow down before responding, can be built in
Have difficulty recalling either visual or auditory information	Provide overviews and summaries, include repetition and guided practice (modeling)	Insert boxes with key generalizations at beginning of instructional segments; allow correct answers to be chosen from a list of provided options rather than asking for open-ended student responses; further sequence and branch instruction at several levels of difficulty
Have difficulty taking what is learned in one context and applying it to new situations (generalization/transfer skills)	Introduce more comparisons; likeness/difference activities using examples from prior learning and predictions for future applications	Add a variety of concrete, real life examples; include questions asking students how the information might be used in the future; carefully match instructions with activities and evaluation
May be unaware of when they are making mistakes	Match reinstruction to error analysis of trends/typical mistakes of students	Program immediate feedback and reinforcement statements, both positive and negative; program a capability to analyze work patterns to determine where a student needs extra practice or instruction; add scoring and self-correcting components for student self-checks

placement of a black border around student materials is an effective technique for limiting the visual field and helping learners concentrate and focus on the printed page.

Some students are overwhelmed when they open a textbook, especially if they have reading problems or problems related to their self-concept. Sometime, fear is paralyzing and self-defeating. Professional literature in the teaching of reading cites the use of an "advance organizer" that can held ready the mental set to receive new information.

Previews of chapters of the textbook can be prepared as an "advance organizer" and summaries can serve as a review to the text. They should be written at a reading level below that of the textbook to provide those students who struggle with reading activities with a supplement that is easier to handle. The previews help to create pre-reading anticipation and the summaries serve as a review aid. These resources can help students who find preparing for a quiz especially difficult since they can focus on major points in each chapter. They also can be used as a stimulus for class discussion or for directed student reading assignments.

Other student activity worksheets can be prepared that focus on specific skill development and that are at a level of difficulty appropriate for mildly handicapped students. These worksheets can be created to closely follow formats used in the textbook but they can be simplified by lowering the vocabulary presenting smaller amounts of material, and by repeating and reviewing the skills to be learned.

Print supplements can also be designed to assist teachers in developing strategies to use the basic textbook in a classroom that includes a wide range of activities. Information should be included on the learning characteristics and needs of mildly handicapped students. Alternative strategies to managing the ability-integrated classroom and suggestions for creative supplemental activities are also helpful to the teacher coping with an ability-integrated classroom.

For each chapter in the textbook key vocabulary can be identified. Primary and enabling objectives can be written for each section within each chapter of the textbook. Teachers can use these objectives to develop activities and to evaluate student performance.

Other Media

A new phenomenon is the emergence of interactive video. Interactive video integrates the computer's logic with the realistic presentation of the sound, color and motion of video. It creates and individualized interactive learning system that allows for flexibility of input (keyboard or touch pad) and collects, analyzes, and reports results immediately. Interactive video simulation enables individuals to have realistic experiences that might otherwise be impossible due to physical limitations, instructional costs, or danger. It can be used to enhance and extend basic textbook instruction in a variety of content areas.

Filmstrips are another excellent supplemental material that offers a visual stimulus for students. When combined with sound, they are especially effective for students whose learning styles are auditory and who struggle with the printed page. The use of filmstrips for educational purposes is as widespread as the green chalkboard and as well accepted in the classroom as any piece of equipment can be.